

DOE Solid-State Lighting Market Introduction Workshop

Welcome

July 18, 2012

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U.S. Department of Energy

Why Are We Here?



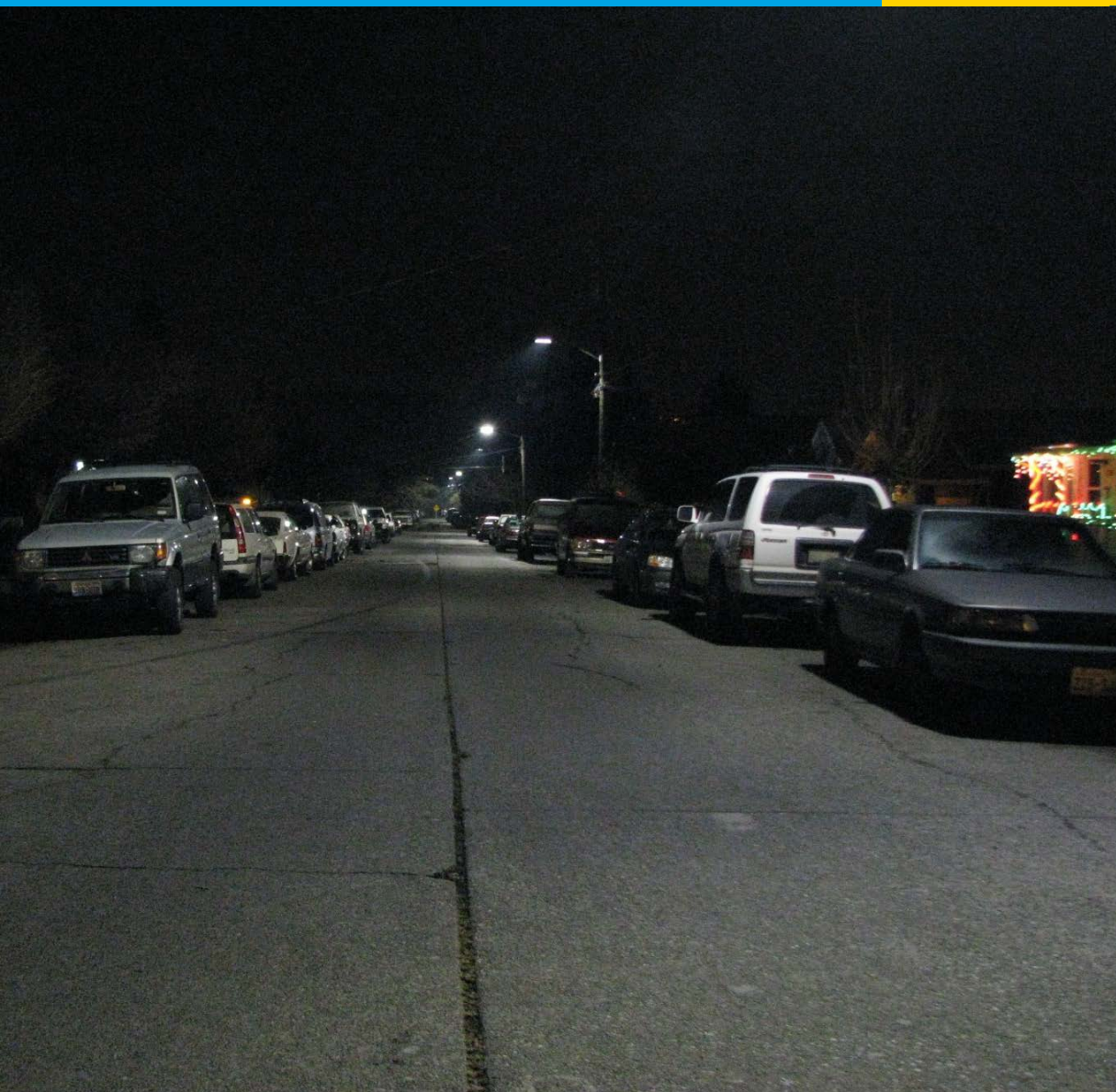
- ☒ A. Ride the coasters at Kennywood
- ☒ B. Sample famous Primanti Bros. sandwich
- ☒ C. Sample local brew
- ☒ D. Learn, share, participate

- Product performance increasing rapidly
- Prices falling
- SSL products: viable, cost-effective options in a growing number of lighting applications



So what's the problem?

The View from One City...



Product Price (2500 units)

Fall 2009	\$369
Spring 2010	\$289
Fall 2011	\$239

The View from One Retailer...



A19 lamps	Highest output	Best color rendering
July 2010	350 lumens	82 CRI
July 2011	810 lumens	90 CRI

Compatibility Is Key

Improperly matched dimmers, drivers, and LED sources
can have unintended consequences...



- Solid-state lighting is fundamentally different from incumbent lighting technologies
- Not a one-for-one replacement solution
- Performance characteristics can be quite different
 - Lifetime, lumen maintenance, dimming, color maintenance, reliability, flicker, color quality
- Installation needs can be quite different

So what can DOE do to make the transition less problematic, less risky, and more successful?



LED Lighting Facts® Products

Welcome to the LED Lighting Facts Product list! This is a complete list of solid state lighting products that have received an LED Lighting Facts label. This list also includes the verified performance information for each product.

There are several ways to search for specific products from this list:

1. Use the drop down box to search by a specific product type.
2. Define specific criteria by adjusting the handles on the slider bars or by entering information into the blank fields.
3. Enter text in the search box, such as a manufacturer or model number.

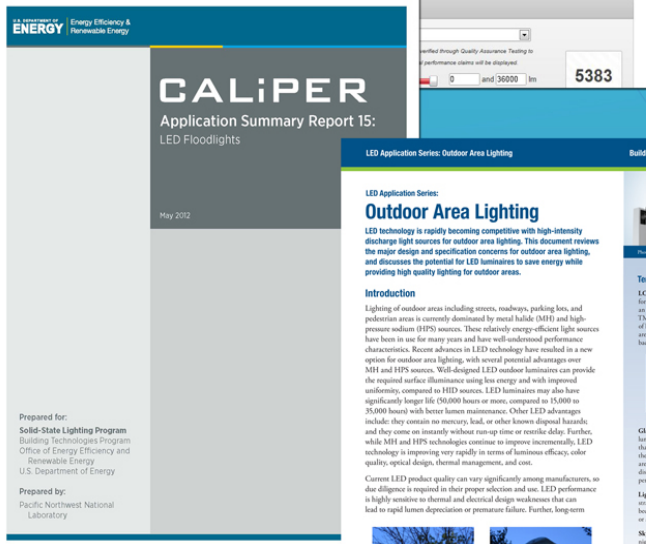
Once you have narrowed your search criteria, click on the search button. You can further refine your search by clicking on the section headers.

Residential and Commercial Product Performance Scales

LED Lighting Facts has two tools for comparing the performance values of LED and standard lighting technologies for the characteristics identified on the LED Lighting Facts label:

- Residential (604 KB PDF)
- Commercial (402 KB PDF)

[Download the full product list](#) (XLS)

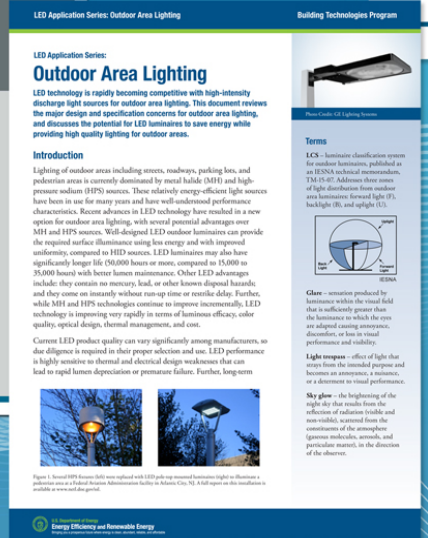


CALIPER
Application Summary Report 15:
LED Floodlights

May 2012

Prepared for:
Solid-State Lighting Program
Building Technologies Program
Office of Energy Efficiency and
Renewable Energy
U.S. Department of Energy

Prepared by:
Pacific Northwest National
Laboratory



LED Application Series: Outdoor Area Lighting

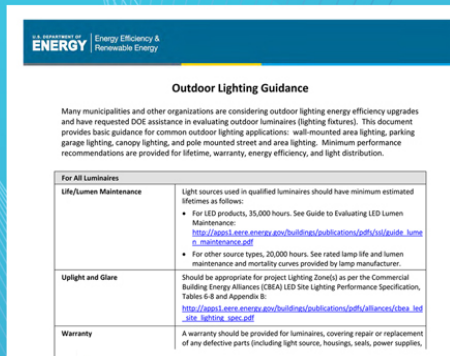
Outdoor Area Lighting

LED technology is rapidly becoming competitive with high-intensity discharge light sources for outdoor area lighting. This document reviews the major design and specification concerns for outdoor area lighting, and discusses the potential for LED luminaires to save energy while providing high quality lighting for outdoor areas.

Introduction

Lighting of outdoor areas including streets, roadways, parking lots, and pedestrian areas is currently dominated by metal halide (MH) and high-pressure sodium (HPS) sources. These relatively energy-efficient light sources have been in use for many years and have well-understood performance characteristics. Recent advances in LED technology have resulted in a new option for outdoor area lighting, with several potential advantages over MH and HPS sources. Well-designed LED outdoor luminaires can provide the required surface illuminance using less energy and with improved uniformity, compared to HPS sources. LED luminaires may also have significantly longer life (50,000 hours or more, compared to 15,000 to 25,000 hours) with better lumen maintenance. Other LED advantages include: they contain no mercury, lead, or other known or suspected hazardous materials; they are instantly without run-up time or restart delay. Further, while MH and HPS technologies continue to improve incrementally, LED technology is improving very rapidly in terms of luminous efficacy, color quality, optical design, thermal management, and cost.

Current LED product quality can vary significantly among manufacturers, so due diligence is required in their proper selection and use. LED performance is highly sensitive to thermal and electrical design weaknesses that can lead to rapid lumen depreciation or premature failure. Further, long-term



Outdoor Lighting Guidance

Many municipalities and other organizations are considering outdoor lighting energy efficiency upgrades and have requested DOE assistance in evaluating outdoor luminaires (lighting fixtures). This document provides basic guidance for common outdoor lighting applications: wall-mounted area lighting, parking garage lighting, canopy lighting, and pole-mounted street and area lighting. Minimum performance recommendations are provided for lifetime, warranty, energy efficiency, and light distribution.

For All Luminaires

Life/Lumen Maintenance

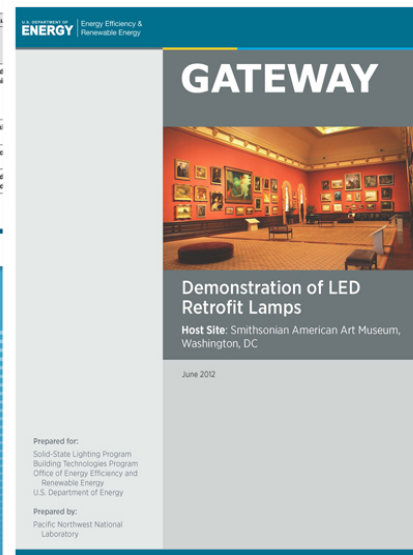
Light sources used in qualified luminaires should have minimum estimated lifetimes as follows:

- For LED products, 35,000 hours. See Guide to Evaluating LED Lumen Maintenance: http://www.ledsource.org/building/buildingsolutions/pdf/evalguide_lumen_maintenance.pdf
- For other source types, 20,000 hours. See rated lamp life and lumen maintenance and mortality curves provided by lamp manufacturer.

Should be appropriate for proper lighting (200 fc) as per the Commercial Building Energy Alliance (CBEA) LED Site Lighting Performance Specification, Tables 6 & 8 and Appendix B: http://www.ledsource.org/building/buildingsolutions/pdf/alliances/cbea_led_site_lighting_spec.pdf

Uplight and Glare

A warranty should be provided for luminaires, covering repair or replacement of any defective parts (including light source, housings, seals, power supplies,



GATEWAY

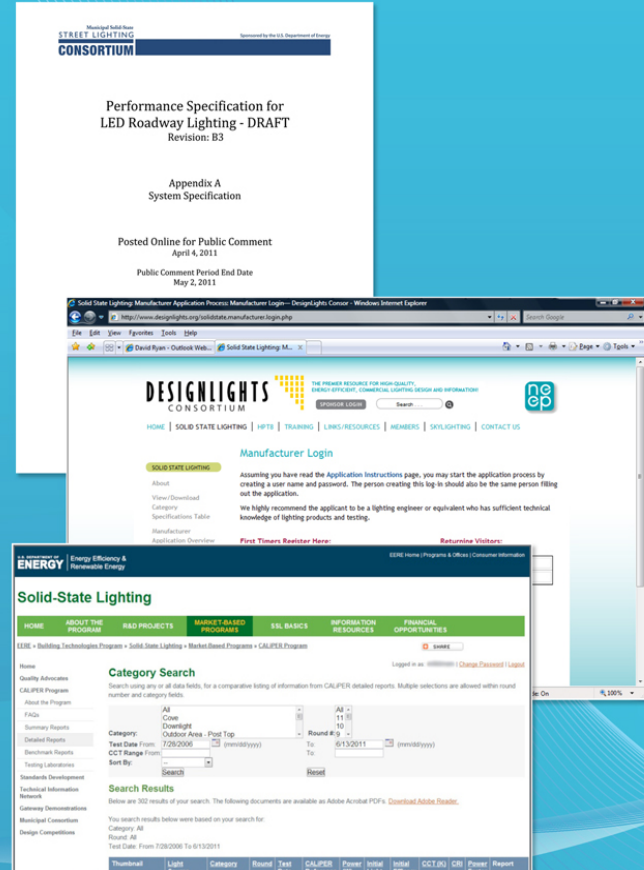
Demonstration of LED Retrofit Lamps

Host Site: Smithsonian American Art Museum, Washington, DC

June 2012

Prepared for:
Solid-State Lighting Program
Building Technologies Program
Office of Energy Efficiency and
Renewable Energy
U.S. Department of Energy

Prepared by:
Pacific Northwest National
Laboratory



STREET LIGHTING CONSORTIUM

Performance Specification for
LED Roadway Lighting - DRAFT
Revision: B3

Appendix A
System Specification

Posted Online for Public Comment
April 4, 2011

Public Comment Period End Date
May 2, 2011

DESIGNLIGHTS CONSORTIUM

HOME | SOLID STATE LIGHTING | HFPS | TRAINING | LINKS/RESOURCES | MEMBERS | SPONSORING | CONTACT US

Manufacturer Login

Assuming you have read the Application Instructions page, you may start the application process by creating a user name and password. The person creating this log-in should also be the same person filling out the application.

We highly recommend the applicant to be a lighting engineer or equivalent who has sufficient technical knowledge of lighting products and testing.

Solid-State Lighting

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Category Search

Search using any or all data fields, for a comparative listing of information from CALIPER database reports. Multiple selections are allowed within round number and category fields.

Category: All
Test Date From: 7/28/2006 To: 6/13/2011
CCT Range From: 2700 To: 6500
Sort By: Round Number

Search Results

Below are 302 results of your search. The following documents are available as Adobe Acrobat PDFs. [Download Adobe Reader](#).

You search results below were based on your search for:

Category: All
Round: All
Test Date From: 7/28/2006 To: 6/13/2011

Thumbnail | Light Source | Category | Round | Test Date | CALIPER | Power | Initial | CCT (K) | CR | Power | Power

ssl.energy.gov

- Rich mix of perspectives from industry experts on key issues and trends
 - Product prices and cost effectiveness
 - Reliability and lifetime: LED device plus other components
 - Lessons learned from city planners, utilities, facility managers, lighting showrooms, electrical contractors
 - Dimming, color quality, equivalency
- DOE workshops: A crossroad for collaboration
 - Acuity Brands Lighting • Canaccord Genuity • City of Boston
 - City of Chattanooga • City of Philadelphia • Colliers International
 - Efficiency Vermont • Energy Trust of Oregon • Grainger • Gross Electric
 - Legacy Health • Leviton Manufacturing • Mark Schulkamp Electric
 - NEXT Lighting • Platinum Lighting Concepts • Philips Lighting
 - RNM Engineering • RTI International • Seattle City Light
 - Southern California Edison • Strategies Unlimited • Target • The Home Depot



Energy Efficiency &
Renewable Energy

National leadership to
accelerate R&D, market
introduction



Collaborate on strong lighting standards

IALD

Improve
lighting
quality and
energy
efficiency



Enhance
manufacturing and
commercialization
focus

Research

More than 200 research partners, focused on core
technology research and product development

Standards

Collaboration with IES, ANSI, NEMA, NIST, UL, CSA, IEC

Utilities & Efficiency Organizations

More than 30 partners, collaborating on L Prize, LED
Lighting Facts, GATEWAY demonstrations, TINSSL

Designers

More than 45 lighting designers, participating in
roundtables, design competitions, GATEWAY
demonstrations, LED Lighting Facts

The Challenge for This Group

- Learn, share, participate over the next two days
- What is working?
- What is missing?
- What else should we be doing?





***It's light, Jim,
but not as we know it.***